GCSE

Applications of Mathematics (Linked Pair)

Foundation Tier Paper 1 – Finance and Statistics
Mark scheme

93701F
November 2016

Version/Stage: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
M dep	A method mark dependent on a previous method mark being awarded.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
Q	Marks awarded for quality of written communication.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
25.3 …	Allow answers which begin 25.3 e.g. 25.3, 25.31, 25.378.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

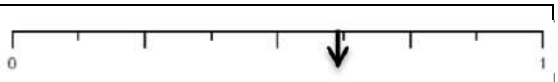
Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the candidate intended it to be a decimal point.

Q	Answer	Mark	Comments
1(a)	1	B1	
1(b)	Tallies correct including 5 bar gates 5, 6, 4, 3, 2	B1	
	Frequencies correct	B1ft	ft their tallies or correct
1(c)	7 or their 5	M1	
	12	A1ft	ft their frequency for red in 1(b)
2	2 × 1.35 or 2.7(0)	M1	
	1.75 + their 2.70 or 4.45	M1	
	5.55	A1	SC1 5.40
3(a)	50p, 20p, 2p, 2p,1p or 20p, 20p, 20p,10p, 5p or 50p, 10p, 5p, 5p, 5p	B2	B1 More or less than 5 coins that total 75p eg 50p, 20p, 5p Condone missing units

Q	Answer	Mark	Comments
3(b)	**Alternative method 1**		
	12 ÷ 2 or 6	M1	oe eg $\frac{1}{2} \times 12$
	12 ÷ 3 or 4	M1	oe
	2	A1	SC2 Giving half of what's left to friend with answer 4
	Alternative method 2		
	$\frac{1}{2} + \frac{1}{3}$ or $\frac{5}{6}$	M1	
	$\left(1 - \text{their } \frac{5}{6}\right) \times 12$	M1	
	2	A1	SC2 Giving half of what's left to friend with answer 4
	Alternative method 3-draws 12 sweets		
	Draws a diagram and shades some sections	M1	
	Shades/crosses out 4 or 6 or 10 sweets	M1	Implies first M1
	2	A1	SC2 Giving half of what's left to friend with answer 4
	Additional Guidance		
	The SC must clearly come from using 1/3 of what is left ie 1/3 of 6 = 2 and 12 – (6 + 2) = 4		
4(a)	unlikely	B1	
	Additional Guidance		
	If more than one word chosen B0		
4(b)	Arrow pointing to 5th mark from zero $\left(\frac{5}{8}\right)$	B1	

Q	Answer	Mark	Comments
4(c)	RR, RB, RW, BB, BW	B2	B1 for 4 correct with extras or omissions ignore repeats
	Additional Guidance		
	RB and BR are counted as one outcome-do not penalise Note WW is not possible. Inclusion of this can still score B1		
5(a)	6 × 10 or 60	M1	may be seen as 15 + 6 ×10
	75	A1	
5(b)	**Alternative method 1**		
	125 – 15 or 110	M1	
	their 110 ÷ 10 or 11 (half hours)	M1dep	
	$5\frac{1}{2}$ hours	A1	T&I methods score 3 or 0
	Alternative method 2		
	125 – their 75 or 50	M1	
	their 50 ÷ 10 or 5 (extra half hours) or 2.5 hours	M1dep	
	$5\frac{1}{2}$ hours	A1ft	ft their 5(a) T & I methods score 3 or 0
6(a)	54	B1	
6(b)	18	B1	

Q	Answer	Mark	Comments
6(c)	Correct bar drawn	B3	B2 36 seen B1 $\frac{40}{100} \times 90$
	Additional Guidance		
	If a build up method is used it must get to 40% for M1		
7(a)	19 + 16 + 14 + 17 + 19 + 18 + 13 + 20 + 18 + 20 or 174	M1	
	their 174 ÷ 10	M1	
	17.4	A1	
7(b)	7	B1	
7(c)	Isobel has her mean/average mark is higher or Isobel as her total for the 10 tests is higher	B1	ft comparison with their 7(a) oe
	Additional Guidance		
	Indicating that Isobel did better as her mean and range are higher is B0		
7(d)	Josh as his range is smaller	B1	ft comparison with their 7(b) oe

Q	Answer	Mark	Comments
8	1 bag of 6 and 3 bags of 10 cost £7.10	B3	B2 For Correct combination of bags (1 bag of 6 and 3 bags of 10) with no total or wrong total OR Two trials with correct totals for 36 sweets Correct trials are 6 bags of 6 = £8.40 3 bags of 12 = £7.50 4 bags of 6 and 1 bag of 12 = £8.10 2 bags of 6 and 2 bags of 12 = £7.80 B1 For any correct combination for 36 sweets SC2 cheapest way 3 × 1.90 + 1.40 cheapest cost 7.10
9(a)	8 seen	M1	**Not** as a denominator
	$\frac{8}{12}$ or $\frac{2}{3}$	A1	Allow 66.6(…)%
9(b)	27	B2	B1 For between 6th and 7th values indicated may be on diagram or $\frac{26+28}{2}$
9(c)	increases	B1	

Q	Answer	Mark	Comments
10	**Alternative method 1**		
	4 ÷ 25 or 0.16 **and** 6 ÷ 40 or 0.15	M1	oe Cost per wash
	(£)0.16 **and** (£)0.15 or 16(p) **and** 15(p)	A1	
	Large	Q1ft	Strand (iii) ft comparison based on their 2 values provided M1 awarded and at least one value correct
	Alternative method 2		
	4 ÷ 5 or 0.8 **and** 6 ÷ 8 or 0.75	M1	oe Cost of 5 washes
	(£)0.8(0) **and** (£)0.75 or 80(p) **and** 75(p)	A1	
	Large	Q1ft	Strand (iii) ft comparison based on their 2 values provided M1 awarded and at least one value correct
	Alternative method 3		
	25 ÷ 4 **and** 40 ÷ 6	M1	washes for £1
	6.25 **and** 6.6(..)	A1	
	Large	Q1ft	Strand (iii) ft comparison based on their 2 values provided M1 awarded and at least one value correct
	Alternative method 4		
	4 × 8 or (£)32 or 5 × 6 or (£)30	M1	oe cost of same number of washes eg 200
	(£)32 and (£)30	A1	
	Large	Q1ft	Strand (iii) ft comparison based on their 2 values provided M1 awarded and at least one value correct
	Additional guidance		
	M mark is for multiplying up to find cost for a common multiple of 25 and 40		

	Alternative method 5		
	4 ÷ 25 or 0.16 or 4 ÷ 5 or 0.8	M1	
	(£)6.4(0)	A1	Cost of 40 washes at 25 box price
	Large	Q1ft	Strand (iii) ft comparison based on their value provided M1 awarded
	Alternative method 6		
	6 ÷ 40 or 0.15 or 6 ÷ 8 or 0.75	M1	
	(£)3.75	A1	Cost of 25 washes at 40 box price
	Large	Q1ft	Strand (iii) ft comparison based on their value provided M1 awarded

11(a)	$\frac{1}{4}$	B1	

11(b)	$\frac{210}{360} \times 300$ or 300 – 75 – 50 or 175	M1	oe
	their 175 – 112	M1dep	
	63	A1	

Q	Answer	Mark	Comments
12(a)	43.66	B1	
	Additional Guidance		
	More than one value circled is B0		
12(b)	= B3*C3	B1	condone missing =
	Additional Guidance		
	D3 = B3*C3 or B3*C3 = D3 B0		
12(c)	= sum(D2 : D4) or = D2 + D3 + D4 or = B2*C2 + B3*C3 + B4*C4	Q2	Q1 for correct formula with no = sign or Q1 for D1 used instead of D2 QWC strand i Q1 correct formula with inclusion of D5 before equals sign eg D5 = D2 + D3 + D4
	Additional Guidance		
	Do not condone 2D, 3D etc = at the end of the formula is B0		

Q	Answer	Mark	Comments
13	**Alternative method 1**		
	272 ÷ 1.36 or (£)200	M1	
	Their (£)200 × 1.03	M1	oe
	(£)206	A1	
	(£) 49	A1ft	ft 255 – their 206 if M2 awarded
	Alternative method 2		
	272 × 1.03 or 280.16	M1	oe
	Their 280.16 ÷ 1.36	M1	
	(£)206	A1	
	(£) 49	A1ft	ft 255 – their 206 if M2 awarded
	Alternative method 3		
	272 ÷ 1.36 or 200	M1	
	200 ÷ 100 × 3 or 6	M1	
	200 and 6	A1	
	49	A1ft	ft 255 – their 206 if M2 awarded
	Alternative method 4		
	(£)255 × 1.36 or 346.8 euros	M1	
	272 × 1.03 or 280.16	M1	oe
	$\frac{\text{their } 346.8 - \text{their } 280.16}{1.36}$	M1	
	(£) 49	A1	SC3 66.64 euros (correct units must be stated)

Q	Answer	Mark	Comments
14	**Alternative method 1**		
	$\frac{1}{4} + \frac{6}{10}$ or $\frac{5}{20} + \frac{12}{20}$ or $\frac{17}{20}$	M1	oe
	$\frac{3}{20}$ is 9 or 9 × 20 ÷ 3	M1	oe
	60	A1	
	Alternative method 2		
	0.25 + 0.6 or 0.85 or 25% + 60% or 85%	M1	not 25 + 60 + 9
	0.15 = 9 or 15% = 9 or 9 ÷ 15 (× 100)	M1	oe
	60	A1	
	Alternative method 3		
	15 and 36	M1	
	15 + 36 + 9	M1	
	60		

Q	Answer	Mark	Comments
15(a)	85*n* seen	M1	
	85*n* + 35	A1	Allow 85 × *n* + 35 SC1 for *n*85 + 35
	Additional Guidance		
	Ignore £ signs Ignore C = oe		
15(b)	**Alternative method 1**		
	Their 85*n* + 35 = 87.5*n* + 15	M1	
	20 = 2.5*n*	M1 Dep	Combining like terms, condone one error
	8	A1ft	ft if equation is linear and answer is an integer
	Alternative method 2		
	One attempt at cost of same number of tables from both companies	M1	
	An attempt for between 6 and 10 tables from both companies	M1	6 = 545 and 540 10 = 885 and 890
	8	A1	
16	**Alternative method 1**		
	1650 × 12 or £19 800	M1	
	(their 19 800 – 10 600) × 0.2	M1	oe
	1840	A1	
	Alternative method 2		
	10 600 ÷ 12 or 883.33(..)	M1	
	(16 500 – their 883.33) × 0.2 (×12)	M1	153.33 scores M2 (monthly tax)
	1840	A1	

Q	Answer		Comments
Q	**Answer**	**Mark**	**Comments**
17(a)	The faster the (take-off) speed the greater the distance (jumped)	B1	oe
17(b)	Line of best fit drawn from between (88.7, 96) and (88.7, 97.5) reaching to between (89.6, 103) and (89.6, 104.5) providing at least two points on either side of the line	B1	oe
	Correct reading from their line	B1ft	ft their line of best fit if increasing ± $\frac{1}{2}$ small square SC1 [98.5, 99.5] with no line of best fit
	Additional Guidance		
	Their line must go horizontally from 88.7 to 89.6 minimum Must be a good attempt at straight but does not have to be ruled. If any line is drawn the SC does not apply. Ignore subsequent rounding eg correct value from their line of 99.3 = 99 (ignore the 99)		
18	(P:Y) 6:15 or (P:B) 6:8 seen	M1	oe
	(P:Y) 6:15 and (P:B) 6:8 or 6:15:8 or 6 **and** 15 **and** 8	M1	
	29	A1	SC2 any multiple of 29
	Additional Guidance		
	Note multiplying all values by 7 (as 2+5= 7 and 3 + 4 =7) does not gain the first M1		

Q	Answer	Mark	Comments
19	Throw the dice and record the result	B1	Can be implied
	Reference to sample size of at least 30	B1	Must be from a single dice
	Reference to 1/6 or expected outcome from their sample size.	B1	
	Comparison of results with reference to how many / what proportion of sixes would be needed to show bias	B1	
	Additional Guidance		
	Examples Throw the dice 50 times and record the result. If the six comes up a lot more times than any other number the dice is biased B1B1B0B1 Throw the dice a lot of times and make a tally of the results. If there are more sixes the dice is biased. B1B0B0B0 The 1/6 can be implied by working out the expected number of sixes eg 1 Uses 100 throws and states that about 16 sixes would be expected. If a lot more than 16 were thrown then the dice may be biased. B4 eg 2 Uses 100 throws and states that if half were 6's and the other numbers had a reasonable spread then the dice may be biased B4		
20(a)	Leading question/tries to make people agree/biased towards the answer 'Yes'	B1	
	Additional Guidance		
	The question is biased B0		
20(b)	Question with time frame eg How many hours of television did you watch last week?	B1	
	At least 3 non overlapping boxes covering all possibilities including zero	B1	
	Additional Guidance		
	If the question asks 'How many hours…' allow integer responses eg 0, 1-2, 3-4 more than 4 as covering all possibilities		